
**अनाज भंडारण के लिए साइलो की
सामान्य आवश्यकताएं**
भाग 2 अनाज प्रबंधन उपकरण और सहायक सामग्री
(पहला पुनरीक्षण)

**General Requirements for Silos
for Grain Storage**

Part 2 Grain Handling Equipment and Accessories
(First Revision)

ICS 55.220; 67.060

© BIS 2020



भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली – 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.gov.in www.standardsbis.in

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Foodgrains, Allied products and Other Agricultural Produce Sectional Committee had been approved by the Food and Agriculture Divisional Council.

Handling and storage of grain in structures like silos requires the use of mechanical and electrical equipment, such as elevators and conveyors and accessories, like drying equipment, aeration equipment and fumigation pumps. The mechanical and electrical equipment is generally housed in a head house attached to a silo. Therefore, this standard, covering the requirements for mechanical and electrical equipment and accessories generally used for handling of grain in silo, has been formulated to assist the planning and construction of silos. It is felt that such a readily available guide would expedite the execution of various silo projects in the country.

This standard was originally published in 1969 and this revision is being taken up to update the provisions given in the standard in view of the latest practices being followed in this area. This standard is a necessary adjunct to IS 5503 (Part 1) 'General requirements for silos for grain storage: Part 1 Construction requirements'.

This standard is not intended to restrict the initiative and ingenuity of design and construction engineers.

In this standard, it has been assumed that the work of installation of various equipment would be according to the prevalent codes for installation and, therefore, the engineering practices ordinarily observed in the installation of these equipment have not been covered. However, wherever it has been considered desirable to elaborate on any such practices, care has been taken to include such elaboration in this standard.

The Committee responsible for formulation of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard***GENERAL REQUIREMENTS FOR SILOS
FOR GRAIN STORAGE****PART 2 GRAIN HANDLING EQUIPMENT AND ACCESSORIES***(First Revision)***1 SCOPE**

This standard (Part 2) deals with the important types of mechanical and electrical equipment and accessories used in a silo for handling of grain in bulk. It also prescribes safety precautions to prevent dust explosions and to minimize fire-hazards.

2 REFERENCES

The standards given below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of these standards indicated below:

<i>IS No.</i>	<i>Title</i>
1641 : 2013	Fire safety of buildings (general): General principles of fire grading and classification — Code of practice (<i>second revision</i>)
1891 (Part 1) : 1994	Conveyor and elevator textile belting — Specification: Part 1 General purpose belting (<i>fourth revision</i>)
2190 : 2010	Selection, installation and maintenance of first-aid fire extinguishers — Code of practice (<i>fourth revision</i>)
2925 : 1984	Specification for industrial safety helmets (<i>second revision</i>)
3594 : 1991	Code of practice for fire safety of industrial buildings: General storage and warehousing including cold storages (<i>first revision</i>)
4240 : 1984	Glossary of conveyor terms and definitions (<i>first revision</i>)

*IS No.**Title*

5503 (Part 1) : 1969	General requirements for silos for grain storage: Part 1 Construction requirements
IS/IEC 62305-3 : 2010	Protection against lightning: Part 3 Physical damage to structures and life hazard
IS/IEC 62305-4 : 2010	Protection against lightning: Part 4 Electrical and electronic systems within structures

3 TERMINOLOGY

3.0 For the purpose of this standard, the terminology given in IS 5503 (Part 1), IS 4240 and the following definitions shall apply.

3.1 Aeration — A process by which a small quantity of air under pressure is moved through grain.

3.2 Drying — A process by which moisture content of grains is reduced.

4 GRAIN HANDLING EQUIPMENT

4.0 General — Hoppers, conveyors and elevators form an important unit for receipt, conveying, storage and issue of grains in a silo. The hoppers feed the grain by direct spouting or through conveyors to elevators, which carry the grain to automatic cleaning and weighing machines and finally to the conveyor in the distribution gallery, where the grain is diverted to various bins.

4.1 Choice of conveyors — There are various types of conveyors in use, common among them being belt, chain, screw and pneumatic type conveyors. The choice of conveyors depends upon the type of grain to be handled in bulk, type of duty to be performed, distance to be conveyed, handling capacity required, availability of space, number and position of charging and discharging points, and the capital and operating costs. These factors are discussed in the following clauses.

4.1.1 Type of Duty Performed — All type of conveyors, such as belt, screw, chain, or pneumatic may be used for horizontal straight conveying. The belt conveyor may be worked up to an inclination of 15° to the horizontal. The screw conveyor may be worked at an inclination, but the capacity would be reduced proportionately to the degree of inclination; an inclination at 15° and 25° may reduce the capacity to 70 and 40 percent, respectively. For stiff inclination the helix should have a short pitch and the through may be made tubular. Chain designed may be worked at any inclination and even in vertical positions restricted to 45°. The pneumatic conveyor may be worked for horizontal, vertical and inclined conveying. Where permanent installations of conveyors. The drive may be by electric motor or by petrol or diesel engine, if electricity is not available.

4.1.2 Distance to be Conveyed — Belt conveyors may be employed for conveying on long distances. Screw conveyors may be restricted to distances up to 30 m to 40 m. In case of the chain conveyors, the distance depends upon the tensile strength of the chain, and is normally less than 30 m. The capacity of pneumatic conveyors falls rapidly with increase in distance, and its use for distances over 50 m should be carefully considered.

4.1.3 Handling Capacity Required — For small handling capacities up to about 80 tonnes per hour, screw conveyors may be used. For high handling capacity, the belt chain or pneumatic conveyor may be used.

4.1.4 Availability of Space — Where the space available is limited, the use of screw, chain, or pneumatic conveyors may be considered, whereas, if sufficient space is available, the use of belt conveyors may be considered.

4.1.5 Number and Position of Charging and Discharging Points — In the case of belt, chain, and screw conveyors, the charging and discharging may be done at several points, while in case of pneumatic conveyors, the charging and discharging points are normally at one place, which may be shifted from place to place.

4.1.6 Capital and Operating Cost — The belt conveyor is the most economical, since running expenditure is less compared to other type of conveyors. The screw conveyor is more expensive than belt conveyor. The initial cost is higher in case of chain conveyors, which also need more of the running and maintenance cost. The initial cost, running and maintenance expenditure are the higher in case of pneumatic conveyors.

4.2 Elevators — Generally, separate elevators should be employed for receipt and issue of grain into and

from the bins or other storage structures. Elevator has a leg with boot for receiving the grain at the bottom and elevator head for discharging the grain at the top. The bucket type of elevator is the most common, and is quite economical and efficient with the least running and maintenance expenditure. The buckets carrying the grain may be made of mild steel, and may be either carried on a chain or a flat belt of synthetic textile and rubber.

4.2.1 The bucket elevators may be self-supporting type to sustain all working loads and self weight unless installed in a head house, where they shall be adequately supported.

4.2.2 Leg casings and connecting spouts shall be dust-tight.

4.2.3 The elevator boots shall be above the floor rather than in pits and be provided with adequate clean-out doors. However, if the pits are necessary, ample room shall be provided for cleaning, oiling and repairing boots. Pits shall be adequately lighted with fixed lights and be accessible by permanent iron ladder or stairways.

4.2.3.1 The elevator boots shall be so constructed as to minimize the probability of chokes and be provided with covered hoppers into which spill and clean-up can be shovelled back into the boot. Choke switches or any other in-built mechanism to avoid choking of elevators may be made available.

4.2.4 Aspiration system shall be installed in the head and the boot of the elevator to avoid dust concentration.

4.3 Layout of Conveyors — While considering the layout of the different type of conveyors, it is advisable to find the shortest course with minimum possible bends. The free flow of the grain from one conveyor to the other, or to the portions where gravity flow is made, should be given consideration. All possible restrictions and choking points should be considered and layout for a smooth flow should be decided. It is necessary that all gravity flows through spouting have adequate cross-sections and suitable inclinations with the horizontal. Hoppers or garners should be introduced wherever there is possibility of accumulation of grain in the flow.

4.4 Requirements for Installations

4.4.1 All structural members, whether of reinforced cement concrete or steel or of any other construction, employed in conveyors, as well as those supporting them shall have adequate strength, considering all static and dynamic loads to which they may be subjected.

4.4.2 The belt conveyors [*see* IS 1891 (Part 1)] and bucket elevators shall have tensioning arrangement of the screw type or of the gravity type.

4.4.3 All the parts of the installations shall be accessible for maintenance and inspection.

4.4.4 There shall be sufficient space all round the machinery and also clear head-room for working purpose.

5 ACCESSORIES

5.0 General

Besides the main handling equipment as given in 4, cleaning machines, drying equipment, aeration fans, fumigations pumps, manlift and temperature detecting devices form essential accessories to the handling equipment.

5.1 Cleaning Machines

The grain brought from field may contain a variety of foreign materials, like straw, insects, stones and dust. Cleaning machines should generally be employed to clean the grain by sieving and should be connected with large dust collectors, which remove the dust by suction. Overall capacity of the cleaning machines may match the capacity of the elevators.

5.1.1 All cleaning, or other grain processing machinery shall be of non-combustible construction.

5.2 Drying Equipment

Grain with more than 14 percent moisture is not recommended for storage in silo. When the grain with high amount of moisture is received, it shall be dried either in sun or, if the moisture content of grain is high, drier should be used. The drying equipment should be generally housed in a drier house attached to a silo. It may consist of a chamber in which the grain should be allowed to fall in a zig-zag fashion through baffles placed in a line and hot air blown from the sides of the chamber. It may be a continuous process allowing the grain to pass through it several times depending upon the amount of moisture to be removed.

5.3 Temperature Detection Equipment

The deterioration of grain is shown by development of hot spots at different places in a bin. It is, therefore, necessary to provide for a temperature detection equipment in order to detect any rise in temperature at different points and pitch. The system shall consist of temperature sensing devices placed vertically inside the bins from bottom to top at vertical intervals of 1.5 m. At least one sensing device should be provided for a radius of 3 metres in the horizontal plane. The device shall be connected by cables and led to reading instruments suitably located outside the bins. The cable

insulation inside the bin shall be resistant to abrasions, moisture and chemicals.

5.4 Aeration Equipment

The grain in storage may require periodical aeration to keep it in satisfactory condition to prevent increase in temperature and development of hot spots on grains. The process may consist of blowing air through grain either from below or from above. The floor of the bin should be perforated and the chamber below the floor be used as a plenum. Alternatively, air may be blown through a tunnel having a number of ducts leading to all directions at the floor level, or aeration vents may be provided to hopper-bottom bins. The net area of perforations may normally be about 15 percent of the gross floor area. The air required for aeration shall be roughly calculated on the basis of 75 ml/litre/min.

5.5 Fumigation

Fumigation of stored grain may be necessary to protect it from insects. Fumigation of grain may be done either by tablets through applicators or pouches which may be placed on the conveyor belt or in the head space of the silo, provided with air circulation system to ensure uniform distribution of fumigant inside the grains. Silo fumigation may also be done using phosphine generators. .

5.6 Weighing and Bagging Machines

It is necessary to have arrangement of weighing machines for weighing incoming grain, in the head house. They may generally be installed close to cleaning machines may also be installed at the issue point. Similarly, bagging and stitching machines may also be installed in the silo.

5.7 Man Lift

Normally, the mechanical and electrical installations and the accessories of silo require frequent trips of staff for maintenance, repairs and inspections. An electrically operated man lift with a capacity of two to three passengers may be necessary. The lift shall be installed in the head house which should go up to the last stage of the head house.

5.8 Communication Devices

In a silo installation, where a number of conveyors work in a line, it is frequently required to be communicated from a control room with the staff posted at different stations. For this purpose, telephone, mobile or a walky-talky may be provided. However, where, for economic considerations, provision of telephone, mobile or walky-talky may be considered difficult, a system of sounding hooters or sirens may be arranged. This may help to warn people to be on the guard as the conveyors and other equipment, on which they are working, are

started. The telephone, mobile or walky-talky may also be necessary for calling outside help in emergency.

5.9 Fire-fighter equipment

It is necessary to provide for fire-fighting equipment in a silo. Selection of the equipment depends upon the type of conveyors to be handled. Arrangement of right type of fire extinguishers should be made (*see* IS 3594). It may be advisable to have provision of one or two types of fire extinguishers supplemented by fire-hydrants running throughout the area of the silo. The following information may be useful in selecting the right type of fire extinguishers (*see* IS 1641 and IS 2190):

Material	Fire Extinguishers
Paper, wood, rubber and general articles requiring cooling and quenching	Soda-acid and foam type extinguishers
Burning liquid, such as gasoline, paint, oil or grease, requiring smothering for quick extinguishment	Carbon dioxide, as also chemical type extinguishers or foam type extinguishers
Live electric wires from motors, electric appliances, etc, where non-conducting extinguishing agent is needed	Carbon dioxide, as also chemical type extinguishers

5.10 Control Room

A large silo installation, where the grain is handled by a number of conveyors working in a line, requires provision of a control room, suitably located with an illuminated board by which the flow of the grain taking place at any time in a particular way, can be reflected on a panel. It is also called a 'mimic indicator' and is especially necessary when there are a number of silo bins to be filled or emptied simultaneously, so that the control room operator would have full control over the machines. An automatic audio-visual bin-level indicator may also be considered as a good adjunct to a silo installation.

5.11 Safety Precautions

Safety precautions in regard to the dust pollution and operation of various mechanical and electrical equipment, described above, shall be observed strictly, and inspection and necessary cleaning of the whole structure shall be carried out periodically to avoid fire-hazards, explosions and other accidents, which may result in loss of valuable grain, equipment and human life. The following safety precautions shall be observed.

5.11.1 Dust pollution of atmosphere and dust explosion

High concentration of dust in air may catch a spark or fire at any place and may cause simultaneous ignition of particles and finally an explosion. Hence, it is important that dust should, as far as possible, be kept under control.

5.11.1.1 All feeding and discharging points where dust is likely to be raised, aspirators with dust catching cyclones shall be provided in order to minimize the nuisance.

5.11.1.2 The area all round the machinery and the conveyors shall be kept clean.

5.11.2 All electrical wirings, fittings, fixtures and electric drive motors installed in dust-laden atmosphere, except in the open and in offices and similar locations so occupied and segregated as to be reasonably free from dust, shall be flame-proof. In case of electric motors installed in open, the same may be of totally enclosed type.

5.11.3 Trailing cables of all portable type of conveyors shall be closed by flexible metal conduits throughout and rigidly fixed at both ends. All portable motors shall be connected to two distinct earths.

5.11.4 All fast moving parts of the installation shall be protected by guards or covers, while the running belt of a belt conveyor need not be provided any protection. All bucket elevators shall

be provided, wherever necessary, with automatic back-stop arrangement, so that in case of power failure during the full load, running of the elevator in the reverse would not be possible. Pull cord switches shall be provided for belt conveyors and belt sway switches shall be provided for elevator belts.

5.11.5 All elevators shall be equipped with an automatic mechanical or electrical tamper-proof device to shut off driving power leg, in case leg belt slows down. An interlocked device should simultaneously shut off power on all contributory screw or belt conveyors which feed the elevators.

5.11.6 The possibility of a choke-up arises when the grain flows in a number of conveyors in line. It is, therefore, essential that all the conveyors working in a line shall be interlocked so that the stoppage of any one but the first conveyor will make all the conveyors after it, inoperative.

5.11.7 A distinctive alarm or signal shall notify operator in case of shut down.

5.11.8 Spouts introducing grain into bins shall be arranged, where possible, to prevent grain stream striking the side of bin on account of the possibility of tramp iron striking a spark on contact with side.

5.11.9 Boards prohibiting smoking and use of naked lights shall be fixed at all prominent places in the area of silo installation.

5.11.10 Adequate hygienic precautions shall be taken for handling grains in all types of conveyors.

5.11.11 Protection against lightning shall be provided in accordance with IS/IEC 62305 (Parts 3 and 4).

5.11.12 In case the silo is located near airways, the aviation obstruction lights shall be provided in accordance with the Civil Aviation Standards.

5.11.13 While handling fumigants, precautions as prescribed by the suppliers and the manufacturers shall be exercised.

5.11.14 Workers shall be provided with masks, when they have to work in a dust-polluted air.

5.11.15 Staff and workers shall also be provided with industrial safety helmets (*see* IS 2925).

5.11.16 Main storage of lubricating oil and grease shall be outside. Storage of lubricating oil and grease in the head house shall be limited to a maximum of 5 barrels and shall be in an oil-room of non-combustible construction.

5.11.17 Lift installation shall be in accordance with the applicable Lift Acts in the country.

ANNEX A

(Foreword)

LIST OF REFERRED INDIAN STANDARDS

Composition of Foodgrains, Allied Products and Other Agricultural Produce Sectional Committee, FAD 16

<i>Organization</i>	<i>Representative(s)</i>
Directorate of Marketing and Inspection, Ministry of Agriculture, New Delhi	J. S. (MARKETING) AND AGRICULTURAL MARKETING ADVISOR (Chairman)
Centre of Excellence for Soybean Processing, CIAE, Bhopal	DR PUNIT CHANDRA DR S. K. GIRI (<i>Alternate</i>)
All India Food Processors' Association, New Delhi	SHRI SHAM BAGGARRY Ms JYOTI SONI (<i>Alternate</i>)
CSIR-Central Food Technological Research Institute (CFTRI), Mysore	DR M. S. MEERA DR V. B. SASHIKALA
Central Institute of Post-Harvest Engineering & Technology (CIPHET), Ludhiana	HEAD (DIVISION OF TRANSFER OF TECHNOLOGY) DR D. N. YADAV (<i>Alternate</i>)
ICAR-National Rice Research Institute, Cuttack (formerly CRRI)	DR AWADHESH KUMAR DR (MRS) PADMINI SWAIN (<i>Alternate</i>)
ICAR-Central Tuber Crop Research Institute (CTCRI), Thiruvananthapuram	DIRECTOR DR M. S. SANJEEV (<i>Alternate</i>)
Central Warehousing Corporation (CWC), New Delhi	SHRI A. K. MALHOTRA SHRI SIDHARTH RATH (<i>Alternate</i>)
CONCERT, Chennai	SHRI R. SANTHANAM, IAS (RETD.) SHRI G. SANTHANARAJAN (<i>Alternate</i>)
Confederation of Indian Food Trade & Industry (CIFTI)-FICCI, New Delhi	Ms PARNA DASGUPTA Ms PRIYANKA SHARMA (<i>Alternate</i>)
Confederation of Indian Industries (CII), New Delhi	MR MANISH WHORRA MR AROMAL JKOSHI (<i>Alternate</i>)
Consumer Education & Research Centre, Ahmedabad	MRS DOLLY A JANI DR ANINDITA MEHTA (<i>Alternate</i>)
Consumer Guidance Society of India, Mumbai	DR SITARAM DIXIT DR M. S. KAMATH (<i>Alternate</i>)
Consumer Research, Education, Action, Training and Empowerment (CREATE)	MR K. SURESH KANNA SH R. PONNAMALAM (<i>Alternate</i>)
Defence Food Research Laboratory (DFRL), Mysore	DR G. K. SHARMA DR A. D. SEMWAL (<i>Alternate</i>)
ICAR - Indian Institute of Maize Research (IIMR), Ludhiana (formerly DMR)	DR R. SAI KUMAR DR DHARAM PAUL CHAUDHARY (<i>Alternate</i>)
Directorate General of Supplies and Transport, Delhi	COL S. C. JOSHI MAJ SONALI DUDHANE (<i>Alternate</i>)
Directorate of Marketing & Inspection, Faridabad	DY AGRICULTURAL MARKETING ADVISOR SMO (STD.) (<i>Alternate</i>)
Directorate of Plant Protection Quarantine & Storage, Faridabad	PLANT PROTECTION ADVISER SHRI R. V. SINGH (<i>Alternate</i>)
Food Corporation of India (FCI), New Delhi	MR A. S. ARUNACHALAM MR SACHIN (<i>Alternate</i>)
Food Safety and Standards Authority of India, New Delhi	Ms APRAJITA VERMA

<i>Organization</i>	<i>Representative(s)</i>
G.B. Pant University, Food Science Division, Pant Nagar	DR SATISH K. SHARMA DR SWETA RAI (<i>Alternate</i>)
In personal capacity	DR S. C. KHURANA
In personal capacity	SHRI I. C. CHADDHA
Indian Grain Storage Management and Research Institute, Hapur	DIRECTOR
Indian Institute of Food Processing Technology (IIFPT), Thanjavur	DR C. ANANDHARAMAKRISHNAN
Indian Institute of Packaging (IIP), Delhi	MR DEEPAK KHEDKAR MR MADHAB CHAKRABORTY (<i>Alternate</i>)
Ministry of Consumer Affairs, Food & Public Distribution, New Delhi	DR SUBHASH GUPTA DR S. C. BANSAL (<i>Alternate</i>)
National Institute of Food Technology Entrepreneurship & Management (NIFTEM), Sonipat	DR ASHUTOSH UPADHYAY DR RUPESH CHAVAN (<i>Alternate</i>)
National Institute of Nutrition (NIN), Hyderabad	DR K. BHASKARA CHARY DR V. SUDERSHAN RAO (<i>Alternate</i>)
National Sugar Institute (NSI), Kanpur	DR V. P. SRIVASTAVA
Protein Foods and Nutrition Development Association of India (PFNDAI)	DR SHATADRU SENGUPTA DR JASVIR SINGH (<i>Alternate</i>)
Vasantdada Sugar Institute (VSI), Pune	DR RAJEEV V. DANI DR SANJEEV V. PATIL (<i>Alternate</i>)
Warehousing Development and Regulatory Authority (WDRA), New Delhi	DR RADHEY KRISHNA TRIPATHI

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 2016* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc No.: FAD 16 (14866).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002

Telephones: 2323 0131, 2323 3375, 2323 9402

Website: www.bis.gov.in

Regional Offices:

Telephones

Central	: Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	{ 2323 7617 2323 3841
Eastern	: 1/14 C.I.T. Scheme VII M, V.I.P. Road, Kankurgachi KOLKATA 700054	{ 2337 8499, 2337 8561 2337 8626, 2337 9120
Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg CHANDIGARH 160019	{ 265 0206 265 0290
Southern	: C.I.T. Campus, IV Cross Road, CHENNAI 600113	{ 2254 1216, 2254 1442 2254 2519, 2254 2315
Western	: Manakalaya, E9 MIDC, Marol, Andheri (East) MUMBAI 400093	{ 2832 9295, 2832 7858 2832 7891, 2832 7892

Branches : AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. COIMBATORE.
DEHRADUN. DURGAPUR. FARIDABAD. GHAZIABAD. GUWAHATI.
HYDERABAD. JAIPUR. JAMMU. JAMSHEDPUR. KOCHI. LUCKNOW.
NAGPUR. PARWANOO. PATNA. PUNE. RAIPUR. RAJKOT. VISAKHAPATNAM.

Published by BIS, New Delhi